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ABSTRACT

A study investigated three issues: (1) differences between two types of rhetorical organization of expository text (problem-solution pattern and collection-of-descriptions pattern) in the reading recall of second-language readers; (2) differences between the two types on reading recall of readers at two levels; and (3) relationship between the ability of second-language readers to recognize and use the top-level rhetorical organization of an expository text and the amount of information recalled from the text. Subjects were 40 students, 20 secondary-school leavers and 20 second-year university engineering students in Hong Kong for whom English is a second language. Two versions of a passage with identical content, one with each type of rhetorical organization, were used. Each text was read by half of each group. Recall of the passages was tested. Results suggest that the rhetorical treatment of propositions in a text influences recall, and that the problem/solution pattern is more effective. However, no difference was found in recall results at the different student levels. The findings have implications for classroom instructional approaches and selection of student texts. A 38-item bibliography and the two text versions are appended. (MSE)

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# A READING EXPERIMENT WITH L2 READERS OF ENGLISH IN HONG KONG - EFFECTS OF THE RHETORICAL STRUCTURE OF EXPOSITORY TEXTS ON READING COMPREHENSION

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## 1 Aim of Study

An experiment was carried out to study how the rhetorical structures of expository texts influence reading comprehension. I was interested in exploring the relationships between text organisation and reading comprehension for the following reasons:

1) The medium of instruction for the majority of Chinese students in Hong Kong is English, as are the course books and reference reading. Therefore, whether these L2 learners can learn successfully depends, to a large extent, on their ability to read and understand expository texts in English.

2) There have been some studies on the effects of rhetorical organisation on reading comprehension; however, with the exception of a few using L2 students studying in the United States, most of them were conducted on L1 students.

Before describing the experiment, I will discuss the schema-theoretic model of reading which forms the theoretic basis of the investigation.

## 2 Theories of Reading

### 2.1 Text Data

Reading is a dynamic process involving the reader and his interaction with the text. Current reading research puts more emphasis on the role the reader plays in the encounter with text than on the text as written language. Readers interact with texts to attain comprehension. However, the fact that texts have objective properties and that text is a vital component of the process seems no longer to receive the same attention.

Educationists, linguists and psychologists recognise that reading comprehension involves skills in following the organisation of a passage. Currently, some researchers are investigating several unresolved issues concerning the relationship between passage organisation and reading comprehension.

One way of representing text is through propositional analysis. Kintsch (1974), Meyer (1975) and Frederiksen (1975) all argued that text information is stored in the memory in the form of propositions. Van Dijk & Kintsch (1977) stated that texts could be organised into macro & microstructures. When text was logically organised with its macro & microstructures in the proper order, then readers processed it more rapidly.

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The term 'rhetorical structure' used in this paper is equivalent to Meyer's (1975) top-level structure and van Dijk & Kintsch's (1977) macrostructure. It refers to the level of prose analysis at which the "gist of portions of the text is central" (Meyer, 1975). At the microstructure level, the relationships within and between individual sentences are at issue; at the macrostructure level, the issue is with the relationships among ideas represented in complexes of propositions or paragraphs. The relationships at this level tend to be logical or rhetorical.

2.2 Schema-theoretic model and macrostructures

The role of schemata is an important one in reading comprehension, because the schemata the reader brings to the reading task guide the reader's selective processing of the data.

Rumelhart (1977) defines reading comprehension as the process of choosing and verifying conceptual schemata for the text. A schema is said to be "a collection of concepts and associative links" (Ortony 1978) or "a cognitive template against which new inputs can be matched and in terms of which they can be comprehended" (Rumelhart & Ortony 1977:131). Schemata are "hypothesis-driven" and provide an interactive approach to comprehension that allows for the interaction of the schema with the incoming data. It is the interaction that is involved in comprehension of discourse.

The story-schema used to comprehend narratives has been discussed extensively and schemata used in expository texts have also been examined. Kintsch (1987) explains the relations between macrostructures and schemata:

> "Macrostructures are generated from a text by the reader and correspond to its gist, as expressed by a summary or abstract. Macrostructures are hierarchical. At the lowest level, only the most irrelevant or redundant information is deleted under some generalisation. However, these operations of deletion and generalisation are applied recursively, so that more and more concise abstracts are generated until at the highest level only a title remains. The reader's control schema determines which of these facts are relevant to his goals and purposes and the macro-structures then pick out from all these facts those that are most relevant, frequently involving the construction of new propositions (generalisations, inferences) from the originals. The guidance by the schema is crucial to the macro-operators. A macro-structure is the product of some controlling schema and a text; if the same text is read by different subjects with different goals (and hence different schema in control), the resulting macrostructures will be to some extent different".

To summarise, Kintsch's model of the role of macro-structures and schemata contends that reading comprehension depends not only on the local properties of the text and the reader's decoding activities at the sentence and paragraph level, but also on the overall structure and paragraph organisation of the text.

Meyer (1987) discusses the relationships between use of the top-level structure and the schema-theoretic model of reading. Using Rumelhart's (1977) model and the schema-theoretic models of Adams and Collins (1979), which stress both bottom-up (from the text) and top-down (from the reader) processing of text, Meyer applied schemata to expository texts with emphasis on top-down processing. She hypothesised that skilled readers have a finite number of abstract,

superordinate schemata that are used in text comprehension and that if the reader recognises and uses the author's rhetorical structure, he will be able to understand better and remember more of the text he reads.

## 2.3 Reading Strategies and Text Organisation

According to this theory, the skilled reader is one who approaches a text with knowledge of how texts are organised. The reader selects from his repertoire the schema that best matches the text to be processed. Poor readers are expected to approach a text without knowledge of its organisation or an effective strategy for perceiving its top-level structure. Meyer et al (1980) hypothesised that the dominant strategy of good comprehenders in a prose-learning task was the structure' strategy. The processing activities for the structure strategy focus on a search for major text-based relationships among propositions. To achieve this, readers approach text to:

a) look for patterns which will tie together the propositions contained in the text,

b) search for the author's primary thesis which will provide the content to be bound by these patterns (schemata), and

c) search for the relationships in this primary thesis and its supporting details.

## 2.4 Studies of the effects of rhetorical structure on reading comprehension

A brief review of the experiments on expository texts which led to the present study is included here to provide background information on some of the research work on text macrostructure conducted in the recent past.

Meyer & Freedle (1979) explored the effects of different types of top-level discourse structures on recall. The 4 types of structure compared are: 1. contrastive pattern; 2. cause-effect pattern; 3. problem-solution pattern; and 4. collection-of-descriptions pattern. Their research shows that seemingly well-organised text materials differ in quality of organisation, which, in turn, affects quality recalled. The first three types of structure have "an extra link of relationship" over the descriptive structure. According to the interactive view of reading, recall of information relayed by the first three types of pattern, which provide extra linkage, should be superior to that of the descriptive structure. Results showed that subjects who were exposed to patterns 1 and 2 recalled more than patterns 3 and 4. Meyer, Brandt & Bluth (1980) conducted an experiment to predict that readers who adopted the strategy of identifying the author's organisation structure would be able to recall more information than students who did not. Results confirmed the prediction.

The experiments described above were conducted on L1 readers. Urquhart and Carrell, however, carried out similar experiments on the effects of rhetorical organisation and recall on ESL readers. Carrell (1984), using Meyer's passage on "Loss of body water" presented in different rhetorical structures, tested the effects of top-level organisation on ESL readers. Results indicated that certain highly structured rhetorical patterns were more facilitative of recall for L2 readers in general. L2 readers tested included Spanish, Arabic, Oriental (Korean and Chinese) and Malaysian.



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## 3 The Experiment

The experiment described below is modelled on Carrell (1984), who in turn replicated Meyer and Freedle's (1979) investigation on whether different organisational plans have a differential impact on reading recall.

The experiment addresses the following research questions:

1) Are there any differences between the two types of rhetorical organisation of expository text - problem/solution pattern and collection-of-descriptions pattern - in the reading recalls of L2 readers?

2) Are there any differences between the two types of rhetorical organisation on the reading recalls of L2 readers at O-Level and at second-year university level?

3) Is there any relationship between the ability of L2 readers to recognise and use the top-level rhetorical organisation of an expository text and the amount of information recalled from the text?

### 3.1 Subjects

40 subjects participated in this study. 20 were O-level students and 20 were 2nd year students on a Bachelor of Engineering degree course in Hong Kong. Chinese is their native language while English is the medium of instruction in the institutes they attend.

### 3.2 Materials

Two versions of a passage with identical content were used. Text A follows the problem-solution structure and Text B the collection-of-descriptions pattern. The rhetorical structures differed, as did a minimal number of ideas necessary for altering the structure. Such differences were explicitly marked in the texts issued to subjects (see Appendix).

### 3.3 Procedures

The two test groups were arranged in a rank order based on students' proficiency in English. Text A and Text B were distributed to the testees alternately to ensure that both were read by readers of comparable standard. Each text was read by 20 students - 10 O-Level students and 10 undergraduates. Students were given two minutes to read the text and were told in the written instructions that they were to imagine that the topic of the text was of interest to them. However, they were not told beforehand that they would be required to recall the passage afterwards.

The subjects were then asked to write down everything they could remember from the text, using words from the original passage or their own words.

### 3.4 Idea Units and Scoring

The identical information in the two texts was reduced to a total of 21 'idea units' for the purposes of marking. The recall protocols were marked. For each unit recalled 1 mark was given, the maximum being 21.

### 3.5 Protocol Organisation

Each recall protocol was classified according to the discourse type used by the subject to organise the protocol:

a) to be classified under the problem/solution pattern, the protocol had to state a problem and present a solution to the problem.

b) to be classified as a collection-of-descriptions type, the protocol had to offer organised descriptions about a topic.

This classification revealed which subjects followed the top-level structure for remembering information in a text.

## 4 Results

Recall data on the 21 identical idea units from the two groups of subjects and the two discourse types were analysed with a two-way analysis of variance. (Discourse type x Reader Group).

Table 1: Analysis of variance by discourse type & reader group

| Source of Variation | Sums of squares | DF | Mean Square | F | Significance of F (exact P-values) |
|---|---|---|---|---|---|
| Main Effects | 60.850 | 2 | 30.425 | 2.072 | p = .141 |
| Group | 5.625 | 1 | 5.625 | 0.383 | p = .540 |
| Text | 55.225 | 1 | 55.225 | 3.762 | p = .060 |

As can be seen in Table 1, the main effects are statistically insignificant at the $p < 0.1$ level for reader group. However, there are differences between the effects of the text types on the reading recall of L2 readers. In other words, the hypothesis that the differences between the two types of rhetorical organisation affect the reading recall of L2 readers is confirmed, while the hypothesis that the differences between the two types of text structures affect the reading recalls of L2 readers at O-level and undergraduate level is not supported statistically.

Table 2: Recall scores by reader group & discourse type
(out of a maximum of 21 idea units)

| | Text A (problem/solution) | Text B (collection of descriptions) |
|---|---|---|
| Group 1 | 11.20 | 8.80 |
| Group 2 | 10.40 | 8.10 |

Table 2 presents the analysis scores of the recall protocols of the two texts with different rhetorical structures scored by both groups of students. The high level of the mean scores, ranging from 8.1 to 11.2 out of a maximum of 21, is worth noting. This range of scores reflects that the L2 readers in Hong Kong managed to remember approximately 38.6% to 53.2% of the total idea units. Carrell's study (1984) using the same text with ESL undergraduates of oriental origins (Korean and Chinese students at Southern Illinois University at Carbondale) reported a recall mean in the range of 3.33 to 7.67, i.e. approximately 15.9% to 37%. The recall scores for Text A, i.e. the problem/solution pattern, were higher than those for Text B for both reader groups. While both text types convey the same idea to the reader, the problem/solution structure provides the reader with additional schemata. Therefore it was expected that recall would be greater from this text than from the less organised descriptive structure. Data from this study related positively to this prediction.

On the other hand, analysis of the subjects' protocol organisation revealed that while 8 out of the 20 students given Text A, of the problem-solution pattern, failed to recall the information in the schematic sequence relayed by the author, all the subjects given text B, of the collection-of-descriptions pattern, recalled the information much as relayed by the author.

This suggests that rhetorical structures which aid information recall are not necessarily easy to recognise. This has implications for L2 performance, specific training being required in the skills of identifying and then using such rhetorical patterning.

Table 3: Recall scores by reader group & ability to use author's rhetorical structure (Kruskall-Wallis Test)

| | Author's Rhetorical Structure Followed | | Author's Rhetorical Structure Not Followed | |
|---|---|---|---|---|
| | Mean Rank | Cases | Mean Rank | Cases |
| Group 1 | 11.57 | 7 | 9.67 | 3 |
| Group 2 | 11.4 | 5 | 8.4 | 5 |

Table 3 shows the recall scores of the testees who recognised and used the problem/solution pattern for their recall and those who did not. It can be seen that testees in both groups who used the top-level structure to organise the recall scored slightly higher than those who failed to do so. Since the number of subjects is small, a non-parametric test, the Kruskall-Wallis one-way ANOVA, is used to compare the 4 sets of recall scores of the two groups. Table 3 shows the results using the Kruskall-Wallis one-way ANOVA. The chi-square value is 1.092 but it is only significant at 0.779. Hence, the difference between the 4 sets of scores is statistically insignificant.

To conclude, the experiment results confirm the assumption that there is a "most logical" treatment of propositions which facilitates recall. However, data from my study do not support the hypothesis that there are differences in the recall results between O-level students and undergraduates. The high correlation between the use of top-level structure in organising one's recall with the amount recalled recorded by Meyer et al (1980) and Carrell (1984) was not found in the results in this study on Chinese L2 readers of English in Hong Kong.

## 5 Different Types of Recall Presentation

Fransson (1984) elaborates Saijo's (1975) three different ways of treating the content of the text, and comments on the three different types of recall presentation.

1) The mentioning type of recall presentation which gives a mere mention of the fact that the author discussed a certain problem or concept in the text is common among subjects who have treated the text as some kind of catalogue where they looked for correct answers.

2) The description type of recall presentation is the most common type among surface-level readers. Subjects read with only a general idea of the demands of an expected test. They seem to organise the different parts of the text as a sequence of separate pieces of information.

3) The conclusion-oriented type of recall is given by subjects who discuss recalls relating to a specific problem or concept and provide some kind of conclusion. This type is found exclusively among deep-level readers. It reflects the search for meaning characteristic of this type of learning.

Urquhart (1987) also observes two different types of reader:

1) The 'surface processer': a reader who tries to re-create the author's message - what Widdowson (1984) calls the submissive reader'.

2) The 'deep processer': a reader who explains his thoughts and reflections and summarises his main conclusions from the text. He is what Widdowson terms a 'dominant reader'.

Many of my subjects fit into the description of the 'conclusion- oriented' type. The conclusions drawn were often introduced by speculative ways of making statements which give the reader freedom and responsibility to make his own interpretations and conclusions. Instead of writing down everything they could remember from the passage, there were some subjects who chose to recall the passage by giving a summarised account of it.

To conclude, this study confirms Urquhart's (1987) observation of the 'deep processer'. It also accommodates Kintsch's model of macrostructures - hierarchical structure as discussed in 2.2, in which the reader's control schema determines which of the facts are relevant to his purposes and the macro-operators then pick out from all of these facts those that are most relevant.

## 6 Limitations of the Study and Implications for Teaching Reading

The first step in developing a theory of learning from prose is to gather data about what readers learn and remember from prose.

The purposes of research on macrostructure are:

1 To collect empirical evidence for or against the claims of some rhetoricians and psycholinguists that some patterns of rhetorical organisation are more facilitative of comprehension and recall.

2 To establish what causes difficulties for L2 readers, with the objective of preparing readers for these difficulties by:

a) sensitising them to the rhetorical organisation of texts,and detecting deviations from "ideal organisation" and/or

b) simplifying texts.

Like most readability studies, the type which studies how top-level structure affects ease of comprehension and memorability has the flaws of all product-oriented tests which frequently view the readers as a homogeneous group rather than individuals with special needs and different backgrounds. Because a free recall test was used for this experiment and protocols were scored according to a predetermined model, it shares the same shortcomings of all other quantitative investigations on reading. Despite these shortcomings, research studies on rhetorical structure and how they might affect understanding and text processing have provided teachers of reading with a theoretical basis for understanding the notion of preparing students to read to learn. The research also represents an attempt to provide empirical evidence for and against the claims of traditional rhetoricians and psycholinguists that have often led to prescriptive advice to writers.

Research on learning from expository texts has demonstrated that the ability to recognise and use a text's structure can facilitate comprehension and memory. Other studies have shown that direct instruction on rhetorical structure can improve readers' comprehension as shown by the amount of information recalled.

### 6.1 Pedagogical Implications

It follows that the implications that can be drawn for the instruction of reading to help L2 readers tackle expository texts could include the following points:

1) Traditional teaching of reading takes the product-approach i.e. readers are taught lexical items and syntactic structures in order that they will be able to answer the comprehension questions set at the end of the text. Experiments on top-level structure show that the process-approach would help understanding and recall. In other words, teachers should not teach what is tested in reading

comprehension tests but rather strategies necessary to the process of reading which will lead to the product, e.g. teach students the necessary rhetorical structures, schemata and cognitive frameworks for comprehending texts in the content areas. Students should be trained in the techniques which will help them to deal independently with all types of texts.

2) Different cultural backgrounds and perspectives are likely to result in a range of acceptable variations in interpreting texts and events and teachers should be prepared to accept different interpretations.

On the role of rhetorical structure training in the teaching of reading, Carrell (1985) makes the following comments:

> "Such training on discourse types is obviously only one part of a comprehensive instructional program in ESL reading comprehension. As Tierney (1983:9) has said, "It is easy to forget that the mastery of the strategy should not displace reading for meaning." A comprehensive instruction program should also include work in schema availability and schema activation, metacognitive training, comprehension monitoring skills, decoding skills etc. Teaching the prototypical patterns of different texts would be inappropriate unless such instruction occurs in conjunction with helping students, in a number of ways, to acquire meaning from text". (Carrell 1985: 742)

### 6.2 Pedagogical Applications

Some of the pedagogical measures to take in order to achieve the above would be to:

1) Select texts that are well organised and elaborated with causal explanations for low level students. Sensitise students to less tightly-structured texts at a later stage. Before doing so, encourage these students to identify rhetorical structures by a variety of methods, e.g. writing outlines for texts, identifying sentences signalling rhetorical structures, recognising topic sentences and sentences carrying subordinate ideas, etc.

2) Assign L2 readers topics and see that they select their own reading materials round the topics. Using the selected materials, the teacher should help readers to identify different organisation patterns used for the treatment of the same topic and to discuss the author's intentions. For well-written exposition where the top-level structure is implicit, readers will be trained to make inferences about the organisation. For poorly-written expository texts which fail to interrelate the ideas logically, the teacher may have to help readers to re-construct a coherent conceptual structure underlying the theme and development of the passage.

3) Expose students to texts with culture-bound topics. Compare and contrast the similarities and differences in content matters as well as organisation structures used in developing thought patterns, e.g. as suggested by Kaplan (1966).

### 6.3 Suggestions for Further Study

Limited by time and other resources, this experiment only compared two rhetorical patterns using a small sample. Before rhetorical structure research can be of more use to the teaching of reading strategies for L2 readers, more studies on texts of various topics and different

organisation patterns are needed in order to develop a comprehensive theory of rhetorical organisation. Studies conducted on a larger scale can also help to offset the harmful effects of over-generalisations from findings validated by statistical analysis alone.

More research on the interpretation of the suitability of certain rhetorical structures for different language groups should also be carried out. This is essential because L2 students' cultural background may lead them to see a different text organisation as more 'logical'. At the moment, L2 readers rely heavily on teaching materials which are based on research using L1 readers as subjects. More investigations on the diversities/similarities between the rhetorical structures used in Chinese texts and English texts should also be conducted. By comparing and contrasting rhetorical patterns in the reader's native language and the foreign language, the teacher can then help readers with reading problems rather than language problems to overcome barriers to comprehension. The teacher can also give them explicit instruction in text organisation patterns seldom used by Chinese authors and therefore unfamiliar to L2 readers.

If the purpose of reading is to "get the author's message" then the reader should first establish what the writer's general framework or structure is. However, a reader does not read every time with the purpose of "getting the author's message". He may scan a passage for specific ideas or read to update his own knowledge on a topic. In these cases, it would be more suitable for him to work within his own schemata and fill in the 'gap' while reading, rather than look for the author's schema (Spiro, 1977).

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APPENDIX

Two different versions of the text "The loss of body water"*

1. **Collection of Descriptions**

SEVERAL ASPECTS OF THE LOSS OF BODY WATER WILL BE DISCUSSED. FIRST, athletic coaches frequently require wrestlers, boxers, judo contestants, karate contestants, and football team members to lose body water so that they will attain specified body weights. These specified weights are considerably below the athletes' usual weights.

SECOND, THE LOSS OF BODY WATER SUSTAINED BY A 150-POUND INDIVIDUAL EACH DAY IS THREE PINTS OF WATER.

THIRD, loss of body water impairs cardio-vascular functioning, which limits work capacity. More specifically, a loss of three percent of body water impairs physical performance and a loss of five percent of body water causes hallucinations. Losses of ten percent or more of body water result in heat stroke, deep coma, and convulsions; if not treated, death will result.

2. **Problem/Solution**

A SERIOUS PROBLEM IS THAT athletic coaches frequently require wrestlers, boxers, judo contestants, karate contestants, and football team members to lose body water so that they will attain specified body weights. These specified weights are considerably below the athletes' usual weights.

A SOLUTION TO THIS PROBLEM IS FOR SCHOOL ADMINISTRATORS TO SUSPEND COACHES WHO REQUIRE ATHLETES TO LOSE BODY WATER. THIS STEP MUST BE TAKEN DUE TO THE FACT THAT THE loss of body water impairs cardio-vascular functioning, which limits work capacity. More specifically, a loss of three percent of body water impairs physical performance and a loss of five percent results in heat exhaustion. Moreover, a loss of seven percent of body water causes hallucinations. Losses of ten percent or more of body water result in heat stroke, deep coma, and convulsions; if not treated, death will result.

* **Key**: Identical content information across the 2 versions is in lower-case letters; different information is capitalised. The words capitalised *and* underlined identify different ideas in the 2 passages. The capitalised words without the underlining explicitly signal the discourse type of each passage